

CLAIMS:

1. A chuck for retaining the shank of a tool bit or accessory inserted in a central channel at a distal end of said chuck, comprising at least one torsion spring mounted axially within a housing and having an inner dimension and shape comparable to said shank's outer dimension and shape, and mechanical means for winding and unwinding said torsion spring to respectively grip or release said shank.
2. A chuck as in claim 1, wherein said at least one torsion spring has a resting inner dimension less than said shank's outer dimension, such that said torsion spring must be partially unwound for said shank to be inserted.
3. A chuck as in claim 1, wherein said means for winding and unwinding said torsion spring comprises a movable sleeve, axial movement of said sleeve producing rotation of said at least one torsion spring.
4. A chuck as in claim 3, wherein said sleeve has an internal profile configured to act on a moveable tang portion of a said torsion spring to produce movement of said tang portion when said sleeve moves axially, said movement of said moveable tang portion winding or unwinding said torsion spring.
5. A chuck as in claim 4, wherein a said torsion spring has a secured end tang and a free end tang, said free tang constituting said moveable tang portion, wherein a portion of said sleeve contacts said free end tang to produce said movement, and wherein said free end tang rides in a slot in said housing, said slot being angled away from an axial direction such that movement of said sleeve causes said tang to move along said slot, thereby winding or unwinding said torsion spring.
6. A chuck as in claim 4, wherein a said torsion spring has opposite end tangs which are secured, and a central tang, said central tang constituting said moveable tang portion, wherein said torsion spring is wound in opposite directions on opposite sides of said central tang portion, such that movement of said central tang portion produces winding or unwinding of said torsion spring.

7. A chuck as in claim 6, wherein said sleeve has an inner profile angled away from an axial direction, such that movement of said sleeve causes movement of said central tang portion by said inner profile acting against said central tang portion.
8. A chuck as in claim 7, wherein said central tang portion has an overlying cap thereon, said cap extending through a circumferential slot in said housing for engagement by said inner profile of said sleeve.
9. A chuck as in claim 3, further comprising a biasing spring arranged to bias said sleeve to an extended position wherein said torsion spring has an inner diameter less than said shank's diameter, to grip said shank, and wherein moving said sleeve to a retracted position unwinds said torsion spring to release said shank.
10. A chuck as in claim 9, further comprising centrifugally-movable means between said housing and said sleeve, arranged such that centrifugal outward movement of said centrifugally-movable means prevents retraction of said sleeve and thereby prevents releasing of said shank.
11. A chuck as in claim 10, wherein said centrifugally-movable means comprises a plurality of balls, and wherein said sleeve has a surface engaged by each ball when said ball moves outwardly, said engagement preventing retraction of said sleeve.
12. A chuck as in claim 1, wherein said shank is cylindrical.
13. A chuck as in claim 1, wherein said shank is not cylindrical.
14. A chuck as in claim 1, further comprising at least one cross member disposed within said housing and having a fixed axial aperture, said aperture sized to receive said shank with minimal clearance, thereby urging said tool bit or accessory to remain axially oriented.
15. A chuck as in claim 14, wherein said fixed axial aperture is non-circular, corresponding in cross-section to the cross-section of a corresponding portion of said shank, said fixed axial aperture thereby augmenting said torsion spring in transmitting torque and preventing rotation of said shank relative to said chuck.

16. A chuck as in claim 1, wherein there are at least two said torsion springs.
17. A chuck as in claim 16, wherein at least one said torsion spring is oriented in one rotational direction, and at least one other said torsion spring is oriented in the opposite rotational direction, whereby said shank is secured in either direction of rotation of said chuck.
18. A chuck as in claim 1, further comprising a plate positioned in said chuck and having a central axial aperture which is slightly larger than a cross-section of said shank when said plate is at 90 degrees to said axis, but which corresponds in cross-section to said shank when said plate is angled away from 90 degrees, said plate being pivotable such that extraction of said shank increases said angling away and thereby tightens said plate on said shank to prevent extraction, further comprising means for straightening said plate towards said 90 degree position, to permit extraction of said shank.
19. A chuck as in claim 3, wherein said sleeve is die-cast metal.
20. A chuck as in claim 1, wherein the internal diameter of the torsion springs has been altered by mechanical means selected from the group consisting of grinding, machining, honing and other metal-removing means.
21. A chuck as in claim 1, further comprising means for recognition/detection of the insertion depth of the shank such, to determine if the shank has been inserted to the correct depth.
22. A chuck as in claim 1, further comprising a collapsible collet inside said torsion spring, for distributing shank-retention forces along a length of the shank.
23. A chuck as in claim 1, further comprising an end cap on an end of said sleeve, permanently attached thereto by a process selected from the group consisting of swaging, welding, peening, adhesive bonding, clipping via a plastic clip, ultrasonic welding, spin welding, staking, or retaining via a retaining ring.

24. A chuck for retaining the shank of a tool bit or accessory inserted into a central channel at a distal end of said chuck comprising a collet with at least two jaws mounted axially within a moveable sleeve, axial movement of said sleeve in one direction causing expansion of said at least two jaws to permit tool bit removal and axial movement in a second direction causing gripping of said tool bit by said device.

25. A chuck as in claim 24 wherein drive may be provided by flats on an end of said shank of said tool bit that engage a corresponding shaped recess on said housing.

26. A chuck as in claim 24 wherein drive may be provided by a non-circular shape on an end of said shank of said tool bit that engage a corresponding shaped recess on said housing.

27. A chuck for retaining the shank of a tool bit or accessory inserted into a central channel at a distal end of said chuck comprising a collet with at least two jaws mounted axially within a moveable sleeve, fractional rotational movement of said sleeve in one direction causing expansion of said at least two jaws to permit tool bit removal and fractional rotational movement in a second direction causing gripping of said tool bit by said device.

28. A chuck as in claim 27 wherein drive may be provided by flats on an end of said shank of said tool bit that engage a corresponding shaped recess on said housing.

29. A chuck as in claim 27 wherein drive may be provided by a non-circular shape on an end of said shank of said tool bit that engage a corresponding shaped recess on said housing.

30. A chuck as in claim 24 wherein the collet is a collapsible, elastomer holding device.

31. A chuck as in claim 27 wherein the collet is a collapsible, elastomer holding device.